

Information Technology and Public Policy: Regulatory Implications for Canada

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INFORMATION TECHNOLOGY AND PUBLIC POLICY: REGULATORY IMPLICATIONS FOR CANADA

By HUDSON JANISCH* AND MANLEY IRWIN**

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I. INTRODUCTION

Any attempt to identify the constituent forces of the information economy is more akin to tracking a motion picture than describing a photograph. What makes the task even more difficult is that the script for the picture remains uncompleted and unwritten—for we are dealing with the future rather than the past. Nevertheless, this paper seeks to examine salient forces that make up the environment of an information economy and then to assess the implications of these forces for policy development in Canada. As points of departure we would offer the following seven observations.

First, information technology is multidisciplinary, multi-industry, multi-governmental and multinational. Such technology blends a diversity of forces without precedent. There is no indication that this confluence of forces will diminish in the decade ahead.

Second, information products are characterized by miniaturization, incredible speed and dramatic cost reductions. These, in turn, translate into lower priced products.

Third, “smart” or “intelligent” products that store, process and transmit information now migrate to more and more users. The result is an added number and range of new information services available to the public. Today, we are experiencing a massive expansion in the number and type of providers selling information services to untapped markets.

Fourth, sellers and products are generating an explosion of information distribution systems, a network of communications within buildings, between buildings, between corporate affiliates, nationally, locally and regionally and, in some cases, internationally. The pent-up pressures spawning such information networks appear irreversible in the decade ahead.

Fifth, market entry of firms into industries and industries into sectors marks a fundamental shift in the structure of an information oriented economy.

Sixth, boundaries separating diverse industries and corporations are softening and eroding. The conventional distinctions between products, services, hardware, industry and geographical locations are withering under technological assault. Indeed, the nomenclature of the past no longer suffices to describe the products, services and content of new offerings today and those in the future.

Seventh, the rate of change associated with technological innovation impacts industry boundaries, costing, pricing and product life. There is no sign of a diminution of this velocity even though rates of acceleration vary from year to year.

These trends mark the broad landscape of an economy in transition—an economy oriented toward a knowledge intensive resource and an information oriented output. That the opportunities of such an economy are limitless borders on the cliché. Certainly the impact on jobs, investment, income and exports, though dimly perceived, carries momentous implications. For instance the burden upon management decision-making in the private sector

will hardly diminish in the decade ahead. In fact, an economy under transition, with its turbulent adjustment, begets a new order of opportunities and a new dimension of risk. If management's function is to manage change, then it will be put to the test in the decade of the 80's.

No less a burden rests with the public sector of an economy. In one sense the public sector establishes the ground rules and incentives that drive an economy. Whether government policy can orient itself to the reality of an information economy under transition, whether government policy can perceive a new reality of risk, dynamism and uncertainty in that economy; whether government policy can anticipate the future rather than merely resurrect the past; whether an economy can instill flexibility and articulation rather than rigidity and stagnation—these issues remain very much on the policy agenda in North America. In this sense, information technology holds an enormous challenge to the public sector, for here the texture, condition and culture of an economy in transition are at stake.

II. THE ANATOMY OF CHANGE

As noted above, the dynamics of an information economy reveals the following anatomy:

- A. Confluence of technology
- B. Unique product traits
- C. Information services
- D. Information distribution
- E. Multiple industry entry
- F. Boundary line decay
- G. Rate of change

A. *Confluence of Technology*

Research in information technology carries with it four facets. It is multidisciplinary, multi-industry, multinational, multigovernmental. The content of research and development (R & D) embraces not one or two but a wide range of disciplines and studies. Consider the following subjects long identified with micro-electronics: computer programming, mathematics, optics, lasers, molecular physics, polymer chemistry, electronics, photography, astronomy, logic and statistics. This list is not exhaustive. Problem solving mandates an interdisciplinary approach and strategy.

The diversity of hardware serves to emphasize the interdisciplinary nature of information products. Today's products include micro-processors, solid state memory, fiberoptics, satellites, digital radio, digital switching, digital robots, digital graphics, voice synthesis and voice recognition to mention a few. Though our catalogue is incomplete, R & D embraces a family of disciplines whose boundaries interrelate and often overlap.

A second trait of R & D is that the number of participants is rarely confined to one or two isolated industries. Rather, any overview of micro-electronics R & D reveals nearly a dozen industries engaging in various facets of microelectronics. Consider the following candidates: telephone, telegraph, consumer electronics, computers, computer peripherals, software,

broadcasting, aerospace, semiconductors and business equipment.¹ Though it is difficult to quantify precisely the technical resources devoted to R & D, it is common for semiconductor firms to plow some ten per cent of their gross revenue into the R & D effort.² This much is certain: information technology tends to be R & D intensive.

Third, technological R & D is international in scope and reach. Major multinational corporations, committed to activity on a vast spectrum of disciplines, reside in Western Europe, Canada, United States and the Far East. To the extent that technology supersedes borders and boundaries, no one nation or firm possesses exclusivity in controlling the state of the art. This enormous effort devoted to research spills into the size, speed and cost of information hardware, namely, the product traits of microelectronics.

Finally, government is no longer neutral in its attitude toward the R & D effort. Whether directly through research grants and subsidies or indirectly via tax breaks and defense spending, government policy continues as a patron saint in the R & D arena. Multigovernmental patronage is manifest in Europe, North America and the Far East.³

B. *Unique Product Traits*

1. Size

Product size—miniaturization—is a direct spin off of inevitable improvements in integrated circuit density. Beginning with the vacuum tube in the first decade of this century, miniaturization has progressed to the transistor, the integrated circuit, large scale integration and very large scale integration. The past twenty years have witnessed an annual doubling of components per silicon chip. Recently a thirty-two bit microprocessor (a computer on a silicon chip) embodied 450,000 transistors on a chip. Within months that density was boosted to 600,000 transistors per chip.⁴ The goal of imbedding one million elements on a single chip is regarded as a goal obtainable before the decade is out.

As chip density increases, products weighing tons or pounds inevitably are reduced to ounces. That trend holds staggering implications. Products once stored in a room can now be carried in one's pocket or purse. A digital watch that doubles as a telephone is no longer in the realm of the fanciful. A hand held computer will hold more logic and memory than a telephone exchange in downtown offices.

¹ Irwin, "U.S. Telecommunications Policy: Technology vs. Regulation", 14th International Dutch Institute for Applied Scientific Research (TNO) Conference, *Information Society: Change, Chances, Challenges*, (Rotterdam, The Netherlands, March 18, 1981).

² Irwin, "Technology and Telecommunications: A Policy Perspective for the 80's" in *Working Paper No. 22* (Economic Council of Canada, 1981). And see De Jonguiers, "Clouds over Silicon Valley", *Financial Times*, April 30, 1980 at 19.

³ Land, "Microprocessors and Productivity: Cashing in our Chips", *Technology Review*, Jan. 1981 at 32.

⁴ *Electronics*, 9 Oct. 1980 at 6.

Moreover, experts tell us that the rate of increase in chip density will attenuate very little in the 1980's.⁵ The progression in silicon state-of-the-art is expected to double in component density every two years rather than annually. Despite that "slowdown" progress still borders on the torrential and suggests that reductions in product size will continue at least to the end of the 1980's.

Micro-miniaturization and its spinoff goes beyond the silicon chip. For example:

- (1) computer size has been reduced ten times in the past twenty years;⁶
- (2) private Branch Exchanges (PBX) and word processing products now fit into a suitcase;⁷
- (3) a one-pound fiberoptic replaces 250 pounds of copper cable;⁸
- (4) a satellite earth terminal buried in concrete fifteen years ago is now two feet square and weighs fifteen pounds;⁹
- (5) pigtail telephone central office has dropped in size by one-fifth over the past fifteen years;¹⁰
- (6) one circuit board of eleven chips replaces five circuit boards with 300 chips.¹¹

As this trend in reduced bulk and mass continues, users are in the position to claim they dare not "trust" a computer they cannot lift.

Miniaturization carries with it the further development of vertical integration. Chip density tends to blur distinctions between components, products, and systems. A component yesterday evolves into an "intelligent" product today. A product today holds the potential of evolving into a system tomorrow.

This evolution suggests that the supplier-buyer relationship in information products is not static but dynamic. A supplier of components today may emerge as one's competitor tomorrow. As one semi-conductor manufacturer observed: "if a silicon chip embodies eighty per cent of a product's content,

⁵ Renmore, *Silicon Chips and you* (London: Sheldon Press, 1980) at 2. *Computer World*, 10 Mar. 1980 at 10. Finally, see Mayo, *Communication News*, Mar. 1980 at 2. Mayo is of the opinion that "[t]he number of components per chip can be expected to grow dramatically for at least another 10-15 years".

⁶ Dept. of Industry, *Microelectronics: The New Technology*, (London: H.M.S.O., 1980).

⁷ Reaume, "A Home Telephone Switch", *Telecommunications*, Sept. 1981.

⁸ Vaskevitch, "Fibre Optics: Vanguard of Future Communications", *Computer Data*, May 1979 at 8.

⁹ Silverman, "Local Distribution Field Trials in the United States", 1 Date Conference on Local Distribution, (Montpelier, France, Oct. 27, 1981).

¹⁰ Corfield, "Into the World of Broadcast Systems", in Lightivel, ed., *Communications in the 1980's and After* (London: The Royal Society, 1979) at 15. See also Marsh, "Communications for the Information Age", *New Scientist*, 23 Oct. 1980 at 235.

¹¹ *Electronics Business*, July 1981 at 25.

the last step is minimal, not to say inviting."¹² Hence, more and more suppliers find themselves marketing products directly to end-users. In economic jargon, market entry suggests that competitive suppliers are driven by a unique combination of technology and return on investment.

If vertical integration represents one facet of microelectronics, horizontal distinctions between products are similarly subject to erosion. Ten years ago the distinction between a microprocessor, a minicomputer and a mainframe computer was manifest and obvious. Industry distinctions paralleled such product lines, INTEL—microprocessing; Digital Equipment Corporations—minicomputers; IBM—mainframe computers. Today miniaturization has converted these firms into direct competitors.

2. Capacity

The packing of circuits closer together yields an additional bonus of speed and capacity. The following developments are typical:

- (1) fiberoptics band with potential is several thousand times greater than wire based systems;¹³
- (2) cryogenic computers hold promise of a ten fold increase in instructions processed per second;¹⁴
- (3) a satellite can transmit one billion bytes of memory in minutes versus two days by telephone line;¹⁵
- (4) facsimile rates now permit the transmission of seventy pages a minute versus one page a minute;¹⁶
- (5) broad band coaxial cable systems permit 1.5 megabits per second transmission versus 9,600 bits per second (BPS) of inside wiring.¹⁷

It can be seen that speed, capacity, and volume are but extensions of chip density and size that ultimately yield falling unit costs and prices.

3. Unit Costs

If chip productivity exceeds product price rises, then per unit costs inevitably decline. In microelectronics, hardware prices have not increased but rather have decreased in nominal and real terms over the past twenty years. For example:

- (1) memory costs have declined thirty-five per cent annually over the past two decades, a decline of 10,000 times;¹⁸

¹² "Intel may soon Compete with its Customers", *Business Week*, 22 Mar. 1982 at 63. Also see Schuten, "To Clone a Computer", *New York Times*, Feb. 4, 1979 at 9.

¹³ Free, "Fiber Optics", *Popular Science*, May 1980 at 102.

¹⁴ "Super Cool Solution", *The Economist*, Dec. 8, 1979 at 84-85.

¹⁵ Bothwell, "Telecommunications: Hardware Requirements of the 80's", *Wall Street Transcript*, Apr. 5, 1980, at 57, 842.

¹⁶ Rockhold, "Drawing New Boundary Lines", *Infosystems*, July 1981,

¹⁷ Irwin, "Local Networks in the United States: Technology vs. Regulation", *supra* note 1.

¹⁸ Bylinski, "Here Comes the Second Computer Revolution", in Forster, ed., *The Microelectronics Revolution* (Oxford: Basil Blackwell, 1980) 3 at 12.

- (2) satellite earth terminal costs have fallen from two million dollars to 5,000 dollars in the same time frame;¹⁹
- (3) since 1975 fiberoptic cable prices have dropped eighty per cent;²⁰
- (4) in the past fifteen years satellite communication costs have dropped 600 per cent;²¹
- (5) logic chips have experienced a twenty-five per cent annual price decline over the past two decades.²²

If the ravages of deflation beset equipment prices, productivity adds further to decreases in unit costs. This productivity in turn generates a product substitution effect with a vengeance. Trade-offs abound: the per unit cost of a satellite earth terminal versus terrestrial lines, a fiber optic cable versus copper wire, data transmission versus physical delivery of tape. The tilt of comparative advantage continues as the price numerator falls and capacity denominator rises. Not surprisingly a twenty cent stamp now finds itself juxtaposed against a computer message cost of four cents. It is also not surprising that a population explosion of "smart" or "intelligent" terminals has already commenced, nor that the computer has become a consumer good.

Size, capacity, cost and price expedite the expansion of silicon logic into more and varied applications. The hand calculator, the digital watch and the video game are but manifestations of such machine dispersion. Inevitably, "smart" machines seek to communicate. Driven by logic and memory enhancement, abetted by falling prices, the threshold of digital services now beckons and attracts users.

C. Information Services

Information services are merely external manifestations of micro-electronic hardware. As noted above, product shrinkage leads to mass marketing efforts via retail outlets. Twenty years ago marketing personnel travelled to clients and presentations often required a team approach; this distribution technique remains important for many submarkets today. Miniaturization, however, has added a new distribution dimension—the client goes to the vendor. That supplier might be a computer store, an electronic shop, a mass retailer, a telephone store or a catalogue outlet. Whatever the source, product distribution now finds Sears Roebuck, IBM, Xerox, Digital Equipment, Radio Shack, telephone companies and independent chains marketing their products "over the counter".²³

Mass distribution of "intelligent" machines, their use and availability,

¹⁹ *Wall Street Journal*, July 9, 1981, at 50 col. 1.

²⁰ Polishuk, "Fibre Optics and Communications Newsletter", *Information Gate Keepers*, vol. 2, no. 1, Feb. 19, 1979, at 10.

²¹ *Satellite Communications*, Oct. 1980 at 22.

²² Noyes, "Microelectronics", *Scientific American*, Sept. 1977, 62 at 68.

²³ "Tapping the Mom and Pop Market", *Business Week*, Oct. 27, 1980, at 62; Gross, "C.D. Will Open Retail CPU Shops", *Electronic News*, July 14, 1980, at 15; "Radio Shack to Sell Phones", *Electronic News*, Aug. 28, 1978, at 18; White, "I.B.M. Expands Outside its Sales Channels", *Wall Street Journal*, Oct. 7, 1981, at 2 col. 3.

sets the stage for an expanded array of information services. Subscribers may access data banks, bibliographic services, electronic mail, voice mail systems, entertainment, video conferencing, business news, tax services and banking services to mention the obvious. Factories design products through a network of computer-aided design terminals; offices merge financial, accounting and marketing data; retail point-of-sale devices link to inventory control; bank terminals access offices and homes. The home of the future may well resemble a military command and control centre.

D. *Distribution Networks*

Machine and services, as one form of delivery system are dependent upon a communication network. Such a network is already in place—telephone terminals, inside wiring, local loop distributions to central office, local switching centres and long haul transmission facilities. Capital intensive, today's telephone network is largely regulated on the premise that competition is inimical to the public interest. Yet technology has intruded into, or at least is capable of intruding into, every component of a carrier's capital investment.

First, the telephone instrument today no longer stands alone. Practically every intelligent machine such as the copier, computer, terminal, fax unit, earth terminal and TV set can be perceived as a substitute product.

Second, inside wiring of buildings invites a broadband network of coaxial or fiberoptic cables. Such facilities magnify the constraint and limitation of paired copper wires. Indeed, estimates are that eighty per cent of a business machine's communication is intrasite.²⁴ "Intelligent" products are generating broadband systems that access and interface with a variety of machines: copiers communicate to computers, computers to terminals, terminals to data banks, data banks to remote printers. Today some forty suppliers make available broadband networks capable of linking machines of different speech, protocols and codes. One firm asserts that its network can accommodate 40,000 different machines.²⁵

Third, the local telephone loop is susceptible to competitive alternatives. Consider the candidates: FM broadcast, over the air TV, cable TV, direct broadcast satellites, infrared data transmission, digital radio, packet radio, cellular radio and fiberoptics. And precisely why have competition options arisen in the local telephone market? The answer must be due in part to the population explosion in "intelligent" machines. Computers and terminals can exchange data at 1.6 million bits per second within a building. Satellites can transmit at 6.3 megabits per second between earth terminals. In contrast, the connecting link paired copper wire accommodates transmission rates of 9,600 to 56,000 kilobits per second. Therein resides a communication bottleneck and, hence, an incentive to circumvent the local telephone loop. Produc-

²⁴ *Communications News*, Aug. 1980 at 18. And see Bylinski, "A New Revolution is on the Way", *Fortune*, 5 Oct. 1981 at 196.

²⁵ *Supra* note 1.

tivity and per unit costs have now penetrated what has long been regarded as the last bastion of "natural monopoly".²⁶

Finally, the range of substitutes and options in switching and long haul transmission is multiplying. Today's computer is a communication switch that can be linked to satellites, cable TV or terrestrial micro-wave. Such systems can be offered by common carrier, specialized carrier or on an inter-
corporate or private basis.

E. *Multiple Industry Entry*

The phenomenon of market entry marks a sixth characteristic of an economy in transition—a process that proceeds on two levels. The first level occurs when firms enter a particular industry through enhanced capacity, output, production, employment and growth. Market entry at the firm level can proceed in a number of ways—*de novo* or start up firms, vertical integration (forward or backward), horizontal integration and, in some cases, conglomerate diversification. A survey of the semiconductor, consumer electronics, business equipment, software and terminal markets reveals a dynamic entry and exit process befitting rapid changes in cost and price. On the other hand, market entry in regulated industries is a relatively recent phenomenon. Traditionally, rate of return constraints coupled with licence control have erected formidable disincentives to entry.

As noted in our discussion of technology, the entry process today penetrates markets and industries long regarded as off limits to rivalry and competition. Nowhere is this phenomenon more dramatic than in telecommunications submarkets. What remains unprecedented is the entry of several industries into information products and services—what we inelegantly term multi-industry entry. Here, the telephone, telegraph, computer, software, service bureau, semiconductor, satellite, motion picture and office automation equipment companies cater to the same customers and services, be those services directed to the office, bank, shop or home. Multi-industry entry thus represents a sector shift of an economy whose implications go beyond the mere calculation of cost and price.²⁷ Here we find ourselves witnessing a transition in the very fabric and environment of a knowledge intensive society. Nowhere is that transition more apparent than in the decaying and softening boundaries that have separated industries in the past.

F. *Boundary Lines and Demarcation*

Technology acts to blur otherwise discrete boundary lines. Such blurring can be seen in the fusion of individual products, industry boundaries and geographic demarcations. Consider the phenomenon of product fusion or integration. As depicted in Figure 1, formerly separate products now are coalesced into a single unit.

²⁶ Hirsh, "Major Industry Battle Brewing over Wideband Dems Planned by Tynnet, SBS and ISACOMM", *Computer World*, 7 Sept. 1981.

²⁷ Irwin, "U.S. Telecommunications Policy: Beyond Regulation", *Kommunikation Ohne Monopole*, (Baden-Baden: Names Verlagsgesellschaft, 1980) 52.

Figure 1
*Product Fusion*²⁸

- (1) PBX - memory - logic - display
- (2) keyboard - display - disc memory - data modems
- (3) copier - memory - data modems - printer
- (4) TV set - video cassette - keyboard
- (5) switch - transmission
- (6) dataprocessor - word processor - communications processor

In short, formerly separate products develop into a single piece of hardware. In the process a new nomenclature accompanies the integration. For example, a TV set tied to a telephone line is a videotext; a typewriter embodying logic and memory capability is termed a word processor; a copier incorporating memory chips is now an information processor or an intelligent printer; a PBX linking data terminals is a distributed processor; a cathode ray tube (CRT) with logic and memory is a work station; an on line printer-display is termed an electronic mailer.²⁹ Conventional terms such as letter, telegram, typewriter, copier, facsimile, TV set or telephone take on different meanings as products embrace and incorporate logic capabilities.

Product fusion softens crisp industry boundaries. Twenty years ago telegraph, print, travel, computers, mail, package delivery, airlines, movies and broadcasting were clearly, separately recognizable. Now product boundaries are rapidly dissolving.

Shifting demarcations are evidenced by jurisdictional and industry struggles and disputes: post office versus telephone company; broadcaster versus common carrier; international versus domestic carrier; computing versus communications; videotext versus teletext. Indeed, the Bell System's attempt to automate its yellow pages in Texas was opposed by manufacturers of minicomputers, the newspaper publishers' association and Tandy Corporation (Radio Shack).³⁰ Who could have predicted that a retailer of home computers would find itself competing with a local telephone company!

Industry overlaps and boundary line clashes similarly occur in home energy services. The telephone company offers services that monitor air conditioning, lights, heat, and home information appliances.³¹ But similar services are offered today by the computer industry as well as by suppliers of cable TV.

Electronic mail further illustrates the erosion process. Candidates to provide this service include the telephone company, the post office, satellite companies, computer firms, TV and packet switching and facsimile companies. Indeed, satellite relay of computer files and tapes has prompted Fed-

²⁸ Irwin and Ela, "Communication Regulation under Technological Stress: The Case of Information Services", *P.U. Fortnightly*, 18 June 1981 at 31.

²⁹ "Integrated Office Systems Predicted after '84", *Computerworld*, 16 Feb. 1981 at 28.

³⁰ "Tax Court Ok's Yellow Page Test", *Management Information Systems News*, 24 June 1981 at 29.

³¹ *Electronic News*, 30 Apr. 1981 at 29.

eral Express to diversify into electronic mail employing satellite channels and terminals.

Financial services are also under erosion and attack. Consider the candidates: banks, stock brokerage firms, General Electric, Sears Roebuck, credit card companies and savings and loan associations.³² The definition of a bank may very well turn out to be an automatic teller machine or an 800 telephone number.

Teleconferencing marks still another facet of softened boundaries. In the United States, current suppliers of satellite conferencing include Satellite Business Systems, AT&T and American Satellite. Others such as Holiday Inn, Ramada, and Hilton Hotels offer teleconferencing services as a derivation of their investment in cable TV.³³ Already, public broadcasting stations (WNET-New York) promote video conferencing as a revenue source supplementing public funding. The boundary line between hotels, airlines, telephone companies and TV stations is no longer immutable.

Boundary decay carries with it a geographic dimension. Historically, telephone companies were endowed with geographic franchises on the premise that market entry compromised service cost and quality. Today, telephone companies are entering into each other's exclusive territories on several levels—toll facilities, satellite facilities, local loops, remote terminals and information services. And domestic and international record carriers are diversifying into each other's territories. Obviously a franchise no longer guarantees geographic immunity to entry.³⁴

Certainly, information technology has severed a corporation's tie to geographic location. No longer dependent upon bricks and mortar, corporate headquarters can elect to move about a country at will. Given telecommunication access lines and transportable "intelligent" products, geographic mobility is taking on a new dimension.

In summary, industry, firm and geographic boundary lines are being assaulted. The technological genie is out of the bottle, never to return.³⁵ Indeed, the rate of change of technological innovation has added a new ingredient to an economy in transition, thus marking a seventh characteristic of the economy of the 80's.

³² Betts, "The World's Biggest Retailer Changes Tack", *Financial Times*, Oct. 28, 1981 at 19; And see *Electronic News*, June 8, 1981 at 1; "The New Sears", *Business Week*, 16 Nov. 1981 at 27; Meyers, "A.T.M. Nets go National", *Datamation*, June 1981 at 27.

³³ Lowndes, "Teleconferencing System Expected to Reduce Costs", *Aviation Week and Space Technology*, 8 June 1981 at 322. See also *Wall Street Transcript*, 23 August 1981 at 23, 568; "The Gold Mine in Satellite Services", *Business Week*, 6 Apr. 1981 at 89. Bergreen, "Hello L.A., Miami, Hong Kong", *New York Times*, Aug. 30, 1981 at 33, col. 3.

³⁴ For an overview of these developments see Brock, *The Telecommunications Industry: The Dynamics of Market Structure* (Cambridge: Harvard Univ. Press, 1981), esp. ch. 10, "New Competition III: Changing Industry Boundaries".

³⁵ For an international review of developments, see "The Born Again Technology", *The Economist*, 22 Aug. 1981.

G. *The Rate of Change*

New products compete with old products, new investment with old, new services with old. Innovation is the essence of an information economy. The reverse side of innovation is obsolescence. Product life cycles shorten, driven by intense competition and market rivalry, abetted by computer aided design. One product's design time, for example, was reduced from one year to six months, a not atypical productivity gain. Figure 2 serves to illustrate the nature of short life cycles.

Figure 2
*Product Life Cycles*³⁶

- (1) Teleprinters: 1.5 years
- (2) Integrated circuits: 2 years
- (3) Circuit test equipment: 1 year
- (4) Telephone PBX's: 7 years (and falling)
- (5) Mainframe computers: 4 years
- (6) Display terminals: 1.5 years
- (7) Satellites: five generations in 20 years
- (8) Packet switching: three generations in 8 years
- (9) Microprocessors: three generations in 5 years

Compressed life cycles do not consign existing products to the scrap heap immediately. A dynamic product environment argues forcefully that corporate perception of investment life, depreciation practices and product obsolescence mandates a reassessment of management's perception of time.

A misstep can obviously bring losses. Traditionally, expenditures not covered by revenues in the telephone industry have been infrequent. Yet a German telephone supplier wrote off 230 million dollars on the grounds that its product had been rendered obsolete while still in the design stage.³⁷ Northern Telecom's recent write off of more than 200 million dollars is thought to have been related to product obsolescence.³⁸ All of this suggests that unexpected losses are no longer a phenomenon reserved to the computer industry alone.

The pace of change affects product price and cost. Whether in fiber-optics, satellites, terminals, computers, key systems or PBX's, the rate of cost reduction attendant on productivity jumps appears to be accelerating. To the extent that innovation and obsolescence quicken, management decision making and flexibility will undoubtedly remain crucial factors in achieving corporate success in the 80's.

We are witnessing the evolution of a new order of competition. It is one thing for firms to compete within the defined boundaries of an established industry. But if industry boundaries are faltering then market rivalry assumes a new order of magnitude. In the next decade product and service substitutes will multiply and expand. That condition will inevitably increase and intensify

³⁶ Irwin and Ela, *supra* note 28 at 35.

³⁷ *Wall Street Journal*, Feb. 7, 1979 at 39, col. 4.

³⁸ "Northern Telecom's Setback", *New York Times*, Jan. 21, 1981 at D1, col. 3-5.

risk and uncertainty; and there is no indication of any abatement in technological innovation. The environment of the 80's will indeed be a challenging one for the private sector.

It is under this new order that public policy makers will find themselves forced to re-examine the rules, regulations, prohibitions and sanctions by which they manage changes in the economy. In this respect the burden upon the public sector exceeds that of the private.

III. CANADA AND THE NIGHTMARE OF OPPORTUNITY

Prior to a consideration of the implications of this new microelectronic environment for regulatory policy making, it would be well to step back from immediate regulatory issues to examine perceptions of the broader impact of the emerging information services (which constitute, as we have seen, the external manifestation of microelectronic hardware). This will make it possible to identify some of the attitudinal bases upon which specific policy will be built.

Canadian policy makers are highly ambivalent about the technological ferment in telecommunications. This ambivalence was best captured by David Macdonald, the Conservative government's Minister of Communications, in his description of these developments as "... a technological nightmare of opportunity."³⁹ This same anxiety can be seen in the report of the evocatively entitled Consultative Committee on the Implications of Telecommunications for Canadian Sovereignty, which speaks in ominous terms of the implications of "informatics" for the future of Canada.⁴⁰

So great is the tension between "nightmare" and "opportunity" that policy makers have been largely traumatized into inactivity. There are already widespread complaints of a "policy vacuum" in telecommunications regulation.⁴¹

³⁹ Cited in Buchan, *Converging Technologies: Diverging Regulatory Policies* (1981), 2 C.R.R. 5.

⁴⁰ Consultative Committee on the Implications of Telecommunications for Canadian Sovereignty, *Telecommunications and Canada* (Ottawa: Minister of Supply and Services Canada, 1979) Clyne, Chairman.

⁴¹ For example, James Thackray, President of Bell Canada, is of the view that real regulatory reform has to begin with the government policy makers. "For starters they have to start making policy. Right now there's a vacuum." "Fundamental Shake-up Urged for Federal Regulatory Process", *The Globe and Mail* (Toronto), Dec. 13, 1980 at B-3, cols. 4-8. And see, "Regulators Need Policy Direction", *Financial Post*, Dec. 20, 1980. CRTC Chairman, John Meisel has conceded that with the accelerating forces of technological change, "It seems we're in a perpetual state of crisis here." "Less Back-Biting at CRTC, but Meisel Feels Pressure", *The Globe and Mail*, Dec. 30, 1980 at 4, cols. 4-5. For an overview of industry complaints at the lack of policy see Richards, "CRTC Decisions and Federal Provincial Jurisdictions", (1980), 1 C.R.R. at E33. John Lawrence, Vice-Chairman, Telecommunications at the CRTC, addressed the challenges of technological change in a speech to the University of Toronto *Symposium on Information Technology and Society* on Nov. 13, 1981. "Regulation and Competition: The Need for Reality Testing", (1981) 2 C.R.R. at 5-257. It is encouraging that a Canadian regulator should be prepared to speak out forthrightly on controversial issues of this nature.

There is, as well, a wide divergence between regulatory ambition and regulatory reality.⁴²

On the one hand, there is growing concern about 1) the impact of microchip technology on employment and particularly on the role of unskilled female clerical workers in the office of the future; 2) multi-national R & D strategies and manufacturing locations and their impact on balance of trade and industrialization policies; 3) privacy and the use of greatly expanded information storage capabilities; 4) the impact of the microchip revolution on social equality and the emergence of an under-class of "techno-peasants", and 5) video conferencing, home based computers and urban design.

On the other hand, there is little evidence of a capability to come to grips with immediate issues of information technology. Policy discussion is carried on at a very high level of generality and seems more influenced by the nightmare vision of a nationalistic elite than by any vision of the opportunities as seen by the business community and by most Canadians. In a period of policy pretentiousness, technological pragmatism will always win. Thus, ironically, those who most denounce technological determinism are also those who give it its opening. The implications of any move of policy making to a less rarified and more effective level will be dealt with below. At this stage, it would be best to outline briefly three illustrative examples of the shattering impact of contemporary information technology on long established Canadian regulatory policies.

Nothing better illustrates Canada's negative, reactive and largely ineffective responses to technological innovation than the reaction to the advent of widespread satellite communication. Instead of welcoming this innovation's unique ability to overcome our greatest enemy—distance (Hasn't Canada been described as a country with too much geography and not enough history?) policy makers have been thrown into confusion over this final obliteration of any vestigial electronic boundary. Law enforcement agents have been dispatched to northern camps where dish antennas had been set up aimed at American satellites. On being confronted by angry hardrock miners and lumberjacks, the Mounties have prudently disregarded their public reputation and retired to Ottawa for further instructions. Hotel and motel owners who have installed "illegal" dishes have been prosecuted, with little success.⁴³

⁴² For the high ambitions of government in the regulation of the telecommunications industry, which was described as "the nervous system of the entire economic order", see Lapointe (Senior Assistant Deputy Minister, Department of Communications), "Telecommunications and Government", Canadian Telecommunications Carriers' Association, *Proceedings of Sixth Annual Meeting*, (1977) at 19.

⁴³ For major recent developments see "Lawsuit a New Weapon Against Satellite Dishes", *The Globe and Mail* (Toronto), Jan. 24, 1981 at 13, col. 2-3; "One Defiant Dish", *The Globe and Mail*, Jan. 26, 1981 at 6 col. 3-4; "About that T.V. Antenna on the Grain Elevator", *The Globe and Mail*, Feb. 21, 1981 at 8 col. 6; "Ottawa Ready for Crackdown on T.V. Dishes in Remote Areas", *The Globe and Mail*, May 9, 1981 at 1 col. 1-3; "No Policy Changes on Dish Antennas", *Financial Post*, May 23, 1981 at 3. "Case will Set Precedent on Earth Stations", *The Globe and Mail*, May 4, 1981 at 1 col 1-5; "Illegal Antennas Seen as Threat", *The Globe and Mail*, June 13, 1981 at B2 col 1-5; "Doesn't

The Minister of Communications of British Columbia has mounted an unauthorized receiver on the grounds of the Legislature in Victoria and has demonstrated a working antenna made entirely from indigenous plywood!⁴⁴ It has recently been announced that as a result of high level federal-provincial negotiations there would be some relaxation in regulation and the Canadian Radio-Television and Telecommunications Commission (CRTC) has developed an ingenious licence designed especially for "deserving" northern camps.⁴⁵

In a more positive move, the Commission has belatedly licensed a Canadian northern satellite service and it is to this satellite that all licensed receiving undertakings must be pointed.⁴⁶ With respect to non-broadcasting uses of satellites, government policy has, in effect, protected existing terrestrial facilities from competition at the expense of the potential of extra-terrestrial communication and denied small and potentially competitive users access to satellite communication. This restrictive approach has been challenged by the CRTC and the whole matter is once again before the Cabinet in the Byzantine *TCTS Telesat* appeal.⁴⁷

The stunted growth of the cable industry serves to further illustrate what the President of Canadian Cablesystems Ltd., Mr. Ted Rogers has described as a "fortress Canada mentality."⁴⁸ Brought under the CRTC's jurisdiction by the *Broadcasting Act* of 1968 as a "receiving undertaking", the cable industry has been treated, until very recently, solely as a broadcast medium.⁴⁹ It has not

Hold License to Grab U.S. Shows, Cable T.V. Firm Admits", *The Globe and Mail*, Sept. 30, 1981 at 8 col. 5-6; "Earth Stations Remain in Court", *The Globe and Mail*, Oct. 28, 1981 at 6 col. 8-9; "Cable Firm Acquitted by Judge," *The Globe and Mail*, Oct. 30, 1981. "North to get U.S. T.V. if Loophole Stays Open", *The Globe and Mail*, Nov. 3, 1981 at 5 col. 1-2.

⁴⁴ "B.C. Pirates U.S. T.V. in War with Ottawa", *The Globe and Mail* (Toronto), June 5, 1981 at 10, col. 13. "T.V. Dish Made Out of Plywood has Amusing Sub-Plot: It Works", *The Globe and Mail*, Aug. 29, 1981 at 12 col. 2-3.

⁴⁵ "Proposed Resources Development Installation Licence Order", *CRTC Public Notice 1981-79* (Oct. 19, 1981).

⁴⁶ "Extension of Service to Remote and Undeserved Communities — Canadian Satellite Communications Inc. (CANCOM)", *CRTC Decision 81-252* (Apr. 14, 1981).

⁴⁷ The Cabinet's decision, announced by Order-in-Council, P.C. 1981-3456 (Dec. 8, 1981), appears to be a Delphic compromise which offers little concrete guidance. For example, Eldon Thompson, President of Telesat Canada is of the view that Canada is drifting towards specialized and value added carriers. "If that's the direction the Government wishes to go in, it should go in deliberately. If it wants more competition, it should set the stage for more competition and not back in indirectly on an ad hoc basis." "Telesat Expects Little Change in Service for Broadcasters", *The Globe and Mail* (Toronto), Dec. 21, 1981 at B-1, col. 3.

⁴⁸ In his remarks to the National Symposium "New Developments in Canadian Communications Law and Policy", *Plenary Session*, Ottawa, Jan. 24, 1980.

⁴⁹ While cable companies have been allowed to develop certain limited non-programming services, where proposed services threaten the established media permission has been denied. Thus cable companies have not been allowed to provide potentially immediately lucrative real estate listing services, but have been allowed, on an experimental basis, into the highly speculative world of teleshopping and opinion polling. "Introductory Statement Relating to Decisions CRTC 81-919 to CRTC 81-922", *The Canada Gazette Pt. I*, (Jan. 16, 1982) at 506.

been allowed to expand to its full capacity as a carrier with broadband capability which passes seventy-five per cent of Canadian homes and terminates in units which neatly combine audio and visual capabilities (TV sets). The result has been that Canadian cable companies have had to move to the United States to establish high capability inter-active systems such as teleshopping and home computer services.⁵⁰ Here, as with satellite, Canadian "know-how" and entrepreneurship pioneered only to be stifled by unresponsive regulation.

Traditional regulation of broadcasting, even where its objectives are cultural and nation-building, is largely predicated upon the notion of a limited spectrum and resultant scarcity of frequencies or channels. What happens when coaxial cable, optical fiber and satellites bring about an unlimited number of channels? This third illustrative technological challenge will undercut much of the rationale for broadcast regulation by revealing the extent to which government-mandated restrictions, and not technological limitations, reduce individual choice. Consider the current review of CRTC policy on religious broadcasting. Denominational religious stations, as such, have never been licensed out of a concern that this would not meet the *Broadcasting Act's* requirement that programming present a reasonably balanced opportunity for the expression of differing views. But this, it is now conceded; was largely predicated on an assumption that there would be only a very limited number of stations. As the CRTC has acknowledged, cable and satellites are now capable of providing an almost endless number of channels and long standing policies have to be reviewed to take into account changed technological circumstances.⁵¹

Other countries are also experiencing major shifts in policy to take into account broadcasting of abundance. In the United States, the Federal Communication Commission (FCC) has petitioned Congress to repeal the fairness doctrine and equal time laws on the grounds that they are no longer needed in an age of genuine mass communications.⁵² In the United Kingdom, one of the newest private television broadcasters, Peter Jay, has predicted that technology will overthrow the need for a "spectrum policeman."

Once the technical pretext for electronic publishing has gone, the whole inverted pyramid of regulation and control must be dismantled.

Individuals who wish to make their own programmes will be free to do so. Theoretically, there could be as many programmes as there are viewers.

Every politician, busybody and self-appointed cultural and moral nanny who wants to lay down what other people may and may not communicate to one another will wish to combat this.

⁵⁰ Colin Watson, President of Rogers Cablesystems, reported to the company's annual meeting that monthly revenue per subscriber in Canada is only \$6 while it is more than \$30 per subscriber in Minneapolis where Rogers has recently established a cable system which offers a number of discretionary services. "Rogers Cablesystems Looks for 'Harvest Year' in 1985", *The Globe and Mail*, Jan. 27, 1982.

⁵¹ "Public Hearings on Religious Broadcasting", *CRTC Notice of Public Hearing 1981-54* (Aug. 17, 1981).

⁵² "Toward Easing Broadcast Rules", *New York Times*, Sept. 20, 1981 at 22E, col. 2.

Those who care passionately for freedom in communication and publishing, whether print, electronic or simply oral, need now to gird themselves for a prolonged struggle against old habits and vested interests to ensure that new freedoms, which new technology will make possible, are translated into real freedom for both producers and consumers.⁵³

IV. IMPACT ON TRADITIONAL REGULATION

The most obvious impact of the new technology has been in the attack it has made possible on the previously sacred and ubiquitous notion of a "natural monopoly" in telecommunications. It has now been recognized, in principle at least, in recent regulatory decisions such as the *CNCP-Telecommunications* case,⁵⁴ which allows for limited system interconnect, and the Interim Decision on Terminal Attachment,⁵⁵ which allows equipment providers to attach non-telephone company provided devices to the network, that competition does have a role to play in the provision of telecommunications services.⁵⁶

These openings for competition, while of critical significance as matters of principle, have been quite restrictive and fall far short of developments in the United States with respect to common carriers other than the telephone companies. Certainly, the local distribution facilities of the telephone companies are still regarded as natural monopolies. The traumatic implications of the current technological assault on this, the last bastion of monopoly, will be explored in a later section on the survival of regulation.

Furthermore, as Richard Schultz, Director of the McGill Centre for the Study of Regulated Industries, has pointed out, competition is something of a Trojan Horse which conceals within it yet more regulation.⁵⁷ The advent of limited competition is far from being the equivalent of deregulation. This should hardly be surprising and does not, in itself, constitute an insurmountable obstacle. In any competition between established industry giants and new entrants there will have to be regulatory vigilance to ensure that the competition is fair. To the extent, however, that social obligations are introduced simultaneously they do set up, as Schultz notes, inconsistent and even conflicting carrier goals.

⁵³ "Technology Will Curb BBC and IBA, Jay says", *The Times* (London), Aug. 27, 1981 at 3, col. 1-3.

⁵⁴ "CNCP Telecommunications, Interconnection with Bell Canada", *Telecom. CRTC Decision 79-11* (May 17, 1979).

⁵⁵ "Bell Canada - Interim Requirements Regarding the Attachment of Subscriber-provided Terminal Equipment", *Telecom CRTC Decision 80-13* (Aug. 5, 1980).

⁵⁶ For an overview of Canadian developments see Dalfen, "Competition and Interconnection in the Canadian Telecommunications Industry", in *Kommunikation Ohne Monopole supra* note 27; Kaiser, "Competition in Telecommunications: Refusal to Supply Facilities by Regulated Common Carriers", (1981) 13 *Ottawa Law Rev.* 95. And see Economic Council of Canada, *Reforming Regulation 1981*, (Ottawa: Minister of Supply and Services Canada, 1981) ch. 5, "Telecommunications".

⁵⁷ Schultz, "Competition as a Trojan Horse", Discussion Paper for Delta Dialogue Series, *Seminar No. 19*, Toronto, June 23, 1981.

The advent of limited competition has led to great reliance being placed on the development of a sufficiently sophisticated system of cost separation such as will prevent, or, at least, minimize the undermining of competition by cross subsidies and predatory pricing.⁵⁸ It has also initiated the dismantling of the massive web of cross subsidies which has grown up under the traditional value of service or system wide pricing. Rapid technological change will soon undermine slow depreciation, another pillar of conventional public utility regulation. In the past, telephone companies have exercised considerable control over the process of technical obsolescence. Development cycles were of sufficient length to allow management almost total discretion as to equipment introduction and retirement. Today, product life in the telecommunications industry is assuming attributes of the computer industry. As well, with system connection and terminal attachment, regulators have had to become involved in the setting of technical standards. While initial standards to protect the immediate physical integrity of the telephone network should not present any great problems, American experience would suggest that there are more subtle and intractable problems with the terms and conditions on which competitive carriers are allowed access to local distribution systems.

There are many other regulatory issues such as these which have suddenly become prominent as communications regulation undergoes ever increasing technological stress. One issue, however, which has assumed a dominant stature is the impact of competition on the long standing cross subsidy between toll and local service. An earlier impact of technological innovation (direct dialing, microwave and satellite) led to a rapid reduction in the cost of toll service without any corresponding cost reduction in local distribution. This cost reduction, which coincided with value of service pricing, led to rates which produced a substantial subsidy for local service. What then is to happen when competition from new entrants drives down toll rates closer to costs? Not only does the resultant prospect of higher local rates present regulators with unpopular changes, it is inextricably bound up with the jurisdictional conflicts which plague communications regulation. Local rates are primarily the concern of state and provincial regulators who view the advent of competition in toll with its impact on politically sensitive local rates with considerable alarm. This jurisdictional time bomb will be set aside for the moment in order to examine a number of difficult regulatory policy issues.

First, lack of technological advances in local distribution may simply be a self-fulfilling prophecy as the telephone companies have been assured of a return on their equipment no matter how technologically antiquated. Is it possible for regulators to create incentives for innovation? Will telephone companies co-operate in developing technology which will make competition feasible within the walls of the last citadel of natural monopoly?

⁵⁸ The CRTC has been somewhat tardy in pushing ahead with its Cost Inquiry. This lack of progress was pointed to by the Auditor General in his *Annual Report* for 1981 (at 136-37) and the Commission has recently announced that it is moving to the critical Phase III of the Inquiry, "Inquiry into Telecommunications Carriers' Costing and Accounting Procedures", *Telecom. CRTC Public Notice 1981-41* (Dec. 15, 1981).

Second, why should a competitive market, (toll), subsidize the monopoly market, (local)? Of all public utility theories, this one surely stands monopoly power on its head. The traditional concern has been that monopoly markets will subsidize competitive entry and not vice-versa.

Third, if some form of subsidy is to continue, at what level should it be set? Should it be paid by new entrants, and if so, how?

Fourth, what will be the effect of reductions in toll rates? Will there be a substantial increase in consumption especially with imaginative off peak pricing? Will this increase, in "reaching out to touch someone," compensate for lowered rates thereby greatly reducing the immediate impact of competition?

These are some of the regulatory issues brought to the fore by technological innovation. Will the regulatory system be able to deal with them?

V. REGULATION: THE OVERLOADED ARK

New issues, entrants and actors crowd in upon the regulatory scene. Ten years ago the issues in rate base-rate of return regulation were well known and comfortably shopworn; the only companies subject to regulation were long-established carriers and the actors were few in number and members of a comfortable club sharing common values. Today, the issues are highly complex and disconcertingly unfamiliar. New entrants into telecommunications such as cable companies, mobile telephone and paging operators do battle in an ever changing environment. New actors ranging from associations of large telecommunications users (such as Canadian Industrial Communication Assembly) and equipment manufacturers (such as Canadian Business Equipment Manufacturers) to public interest groups (such as Consumers' Association of Canada and the National Anti-Poverty Organization) put forward novel and often conflicting views on just and reasonable rates and the true nature of discrimination. The regulatory system is thus confronted by a veritable revolution in rising and conflicting expectations.

An example of a new actor and a new issue is the Ontario Hospital Association which has played a major role in bringing about competition in terminal attachment. The extent of the Association's interest becomes apparent the moment it is realized that recent technological innovations have led to highly specialized equipment and facilities especially designed for the unique communications needs of modern hospitals. Similarly, the Canadian Radio Common Carriers' Association has emerged as a major force for access by mobile telephone and interactive paging devices to the telephone companies switched networks, while Broadcast News Limited and the Cable Satellite Network spearheaded the drive to negate Telesat's rate schedule which discriminated against the smaller users of satellite services.

The range and diversity of interests of the current participants in the regulatory process is evident in the 1981 CRTC decision with respect to the TransCanada Telephone System (*TCTS*).

Figure 3
*Parties Represented in the TCTS Case*⁵⁹

Bell Canada	British Columbia Telephone Company
Telesat Canada	CNCP Telecommunications
Canadian Broadcasting Corporation	Consumers' Association of Canada
Government of Ontario	Canadian Cable Television Association
Canadian Federation of Communications Workers	Government of British Columbia
Cable Satellite Network	Canadian Independent Telephone Association
Quebec Telephone	Broadcast News Limited
Director of Investigations and Research, Combines Investigation Act	Government of Quebec
Canadian Association of Broadcasters	National Anti-Poverty Organization
Government of Newfoundland and Labrador	Taqramuit Nipingat Incorporated
	Government of Saskatchewan
	Alberta Government Telephones
	Government of Nova Scotia

The proceedings in this case entailed twenty-two days of hearings including two days for the pre-hearing conference. The testimony during this period resulted in 4,084 pages of transcript. As well, 125 exhibits were filed in evidence, comprising approximately 2,900 pages of information. There were also 508 interrogatories and responses entered in evidence comprising some 3,600 pages. The CRTC took from June, 1980 to July, 1981 to reach its decision which is 221 pages in length. Just over two weeks after the decision's release it was appealed to cabinet by way of a thirty-nine page petition signed by all ten TCTS members.⁶⁰

With this number of parties and such diversity of interests, it is not surprising to find that the *TCTS* proceeding moved forward amidst a plethora of legal challenges, appeals and reviews over and above the usual internal pre-hearing and procedural manoeuvres.

Such was the complexity of the issues in the *TCTS* case that the CRTC resolved that explanatory reports should be prepared in advance of the hearing itself so that interested parties might have a better understanding of the intricate settlement procedure employed by TCTS members. The cost of this study was levied against the federally regulated carriers who promptly appealed that decision to the Federal Court of Appeal. When detailed information was sought on TCTS member companies not subject to federal regulation, this move was challenged by Bell Canada and by British Columbia Telephone before the Review Committee of the CRTC. Subsequently, New Brunswick Telephone and Saskatchewan Telecommunications petitioned the Cabinet

⁵⁹ "Bell Canada, British Columbia Telephone Company and Telesat Canada: Increases and Decreases in Rates for Services and Facilities Furnished on a Canada-Wide Basis by Members of the Trans Canada Telephone System", *Telecom. CRTC Decision 81-13* (July 7, 1981).

⁶⁰ On Oct. 20, 1981, a 35 page supplement was submitted to the Cabinet.

to rescind the order requiring the production of documents while Alberta Government Telephones made an application to the Federal Court seeking to prohibit the Commission from using any of the information it had obtained with respect to non-federally regulated companies.⁶¹ In the end, none of these blocking tactics was successful although Bell Canada's challenge to CRTC costs jurisdiction with respect to the consultants' explanatory reports is still outstanding. As already noted, the decision was appealed to the Cabinet immediately after being issued.

This evidence supporting the old adage that "regulation is a full employment plan for lawyers" admittedly only indicates a rise in the number of legal skirmishes on the periphery of the regulatory process. There are, however, signs that the central core of regulation is becoming grossly overloaded. Consider, for example, current and proposed proceedings which include the need to complete the massive Cost Inquiry now in its 10th year; the annual review of Bell Canada's 1.2 billion dollar construction budget; the terminal attachment rules which must create new ground rules for a competitive era; the proposal to update Bell Canada's General Rules which govern relations between the company and its subscribers, and the massive rate increase applications which seem to arrive before the long list of outstanding items from the case before can be completed.

Despite all the novelty, these are what may be described as routine matters. What threatens to break the back of the regulatory camel are snap applications brought on by technological developments which demand the type of instant answers given in haste and repented at leisure.

Consider four such matters which came before the Commission during 1981:

(1) Bell Canada Voice Message Service⁶²

Should a carrier be authorized to offer a computerized call forwarding service without a full inquiry into the potential discrimination involved in the offering of such an enhanced voice service?

(2) CNCP Telecommunications Telenews Service⁶³

What steps, if any, should be taken to govern the provision of this teletex service?

⁶¹ For further details, see the *TCTS* decision, *supra* note 59, Part II: Legal and Jurisdictional Issues at 21-50.

⁶² The CRTC initially overlooked the significance of this matter and approved the service on an *ex parte* basis. Following a strong objection from the Telephone Answering Association of Canada, public notice was issued. The service was eventually approved on a nine month trial basis with the Commission deferring the central issue—should Bell only provide this type of service through an arms length subsidiary—until a later hearing. "Bell Canada - Voice Message Service Trail", *Telecom. CRTC Decision 81-10* (May 25, 1981).

⁶³ As with Bell's Voice Message Service Trail, *supra* note 62, the CRTC approved this service on a trial basis while making it clear that the substantial issues raised by intervenors would have to be dealt with eventually. "CNCP Telecommunications - Telenews Service", *Telecom. CRTC Decision 81-12* (June 18, 1981).

(3) Bell Canada Envoy 100 Service⁶⁴

What provisions should govern the introduction of this data preparation, storage and retrieval system to prevent possible discrimination and cross-subsidization?

(4) Cable Companies and Teleshopping, Information Services and Shared Computer Services⁶⁵

What, if any, should be the involvement of cable companies as information providers? What of cross-subsidies? Should Canadian content requirements be applied to information services provided into the home? Should Canadian ownership requirements apply to the distributors of packaged material into the home?

This consideration of the growing pressures on regulators and the regulatory process brings us to the central issue raised by the microchip revolution: has it rendered traditional regulation obsolete?

VI. WILL PUBLIC UTILITY REGULATION SURVIVE?

If the technological prognosis and predictions on which this paper is based are accurate, it would be plausible to advocate the complete elimination of traditional rate base-rate of return regulation. Indeed, Nina Cornell, former chief, Office of Plans and Policy, Federal Communications Commission, and others, have taken this view. This approach is particularly attractive if one is confident that the last bastion of natural monopoly, local distribution, will fall to the assault of technology.

Competition to traditional local telephone companies that interconnect telephones by wire could come from wireless systems—two-way radios that operate on new frequencies—or systems that combine radio and wire links. A few relatively modest changes in regulatory restrictions on the use of existing radio systems could open the way to such competition. Similarly, new video technologies such as cassettes and discs, as well as more relaxed rules on subscription and low-power television stations, could be more effective anti-monopoly techniques than state or local rate regulation of cable television systems.⁶⁶

There is, however, need for caution. As a recent research study by Charles River and Associates warns, "... the future ... in so many aspects of telecommunications is unknown—and perhaps is almost unknowable because of the rapidity of technological and market changes."⁶⁷ The assump-

⁶⁴ This service was approved but "... consistent with its statements in previous decisions regarding enhanced services, the Commission does not intend to consider final approval of the Envoy 100 Service until after it has provided an opportunity for public consideration of the issues relating to enhanced services generally." "Bell Canada - Envoy 100 Service", *Telecom. CRTC Decision 81-22* (Nov. 4, 1981).

⁶⁵ *Supra* note 49.

⁶⁶ Cornell, "Rate of Return Regulation: Protecting Whom from What?", *Regulation*, Nov.-Dec. 1980, 36 at 49. See also Cornell, Kelley and Greenlaugh, "Social Objectives and Competition in Common Carrier Communications: Incompatible or Inseparable?" Can. Federal Communications Commission, Office of Plans and Policy, *Working Paper 80-01* (Apr. 1980).

⁶⁷ Meyer et al., *The Economics of Competition in the Telecommunications Industry* (Cambridge, Mass: Oelgeschlager, Gunn & Haig, 1980) at 17.

tion employed here is that technological advances will lead to widespread substitutability and new entrants. Different considerations might apply if one technological development came to dominate distribution. If, for example, the limited capacity of copper wire were replaced by the unlimited capacity of optical fiber, as is being done in Saskatchewan, this would necessitate the retention of at least some aspects of traditional regulation, such as non-discriminatory access and separation of content and carriage.

The total elimination of public utility regulation in telecommunications is unlikely in Canada because this country, especially at the federal level, has never regulated communications purely out of a concern for the dangers of monopoly power. Economic regulation has always been inextricably linked to social, political and distributional considerations. While this may be true of much Canadian regulation, it is particularly obvious in the regulation of communications. This is not to say however that there cannot be a significant shift in emphasis in this regulation.

Regulation with respect to broadcasting in this country has always been concerned with matters of sovereignty, culture and national identity. Significantly, it would appear that these concerns will be carried over into the entire telecommunications field as may be seen from the opening section of the policy objectives of the proposed new *Telecommunications Act*:

3. It is hereby declared that
 - (a) efficient telecommunication systems are essential to the sovereignty and integrity of Canada, and telecommunication services and production resources should be developed and administered so as to safeguard, enrich and strengthen the cultural, political, social and economic fabric of Canada.⁶⁸

Since the Act does not mention competition, except to provide for its possible prohibition, it may be seen as essentially a form of chosen instrument approach to the provision of telecommunications. A chosen instrument approach has, of course, been more openly adopted in Alberta, Manitoba and, particularly, Saskatchewan, where the provincial telecommunications companies are Crown corporations. Rate of return regulation will be seen, not in economic terms, but as a means to attain the ambitious political and social ends assigned to telecommunications. In these circumstances regulation really will be a form of taxation.⁶⁹

Important as this sovereignty-culture-national identity axis is to an understanding of the regulation of telecommunications in Canada, it must be placed in its context. Regulation, like all law and policy, is very different in practice than in theory. The gap between regulatory aspirations and technologically induced realities is already a major feature of regulation in Canada—a gap which is likely to grow with every advance in technology.

Consider the regulation of broadcasting. Section 3 of the *Broadcasting Act* of 1968 boldly proclaims: "... programming provided by each broad-

⁶⁸ *Telecommunications Act*, Bill C-16, 1978 (30th Parl. 4th Sess.).

⁶⁹ For a classic statement of this phenomenon, see Posner, *Taxation by Regulation* (1971), Bell J. Economics 22.

caster should be of high standard using predominantly Canadian creative and other resources." Extensive Canadian content regulations have been enacted to ensure this predominance. Yet at prime time eighty per cent of Canadian viewing is of American programs! Canadian elected representatives and their regulatory delegates vote for Canadian predominance—individual Canadians vote by way of their TV dials for mass consumption of American programming. In large measure this has been made possible by the microwave relay technology of the 1970's making it feasible for cable companies to import, not just individual programs, but entire American stations.⁷⁰

Much the same phenomenon will undoubtedly occur in the broader field of telecommunications. However, for the immediate future, at least, individual choice will not be made as easily. Canadian consumers reading of competitive long distance services in *Consumer Reports*⁷¹ cannot simply switch a dial for competition. Canadian businessmen, aware of developments elsewhere, face major regulatory and carrier resistance should they wish to benefit from these innovations if they are not provided by an established carrier. Despite such differences, there can be no doubt that the availability of new services in the United States and elsewhere will eventually go far to undermine restrictive regulation no matter how high-minded it may be.

Furthermore, developments in telecommunications cannot be isolated from Canada's long standing love affair with regulation. The lukewarm response to the Economic Council of Canada's Final Report and the subsequent issuance of a Proposed Domestic Air Carrier Policy which advocates a "new feudalism" in the air industry in which various types of carriers will be assigned discrete and permanent roles,⁷² and which is diametrically opposed to what the Council urged,⁷³ testifies to the persistence of this affair.

This does not mean, however, that regulation will continue in the same way in an age of rapid technological change. This is a matter dealt with in the last section of the paper. First, the impact of technology on the constitutional issue and on policy making will be examined.

VII. INFORMATION TECHNOLOGY AND CONSTITUTIONAL ALLOCATION

It is possible to identify four major implications of developments in technology for the on-going constitutional debate in Canada.

⁷⁰For a sober assessment by the CRTC of its own success in this matter, see *Canadian Broadcasting and Telecommunications: Past Experience, Future Options*, (Ottawa: Minister of Supply and Services Canada, 1980).

⁷¹"Bypassing Ma Bell", *Consumer Reports*, Mar. 1981 at 164-67.

⁷²The feudal characterization may be found in Consumers' Association of Canada's, *Position Paper on Domestic Air Carrier Policy, Regulated Industries Program*, Oct. 9, 1981 at 3. In a major shift in policy making, the whole matter of domestic air policy has more recently been taken away from the Ministry of Transport and referred to the House of Commons Standing Committee on Transport which is holding public hearings commencing in Feb., 1982. The significance of this shift is not yet apparent.

⁷³Economic Council of Canada, *supra* note 56, ch. 4 "The Airline Industry" at 27-36.

First is the quicksilver nature of the technology itself. How can there be an allocation of roles to return to the analogy employed in the introduction of the paper, in a motion picture with an uncompleted and unwritten script? As Johnston and Buchan, two of Canada's leading communications lawyers have recently concluded:

In dealing with a technology that is changing so quickly and providing many new services, we think it would be counter-productive to attempt to define in a constitution appropriate areas of jurisdiction.⁷⁴

In 1977, at the start of constitutional discussions with respect to communications, it was perhaps still possible to talk in meaningfully discrete terms of telephones, computers, cable and broadcasting. Now with convergence and boundary erosion it is more difficult, if not impossible, to shift such neat little packages backwards and forwards between the federal and provincial levels. As Charles Dalfen, former Vice-Chairman of the CRTC, has succinctly put it: "Jurisdictional debates stress distinctions. Technological change tends to erode those distinctions and to create the need for new ones."⁷⁵

For example, at the start of the constitutional discussions it seemed axiomatic that the regulation of cable would be delegated to the provinces with reservation of federal control over the national element in broadcasting. This would, in effect, have given the provinces very little. But now that cable is no longer merely "the biggest antenna in town" but is seen to hold out massive potential as an alternate broadband telecommunications system to the telephone companies' limited copper wire, that is, its simple "broadcast receiving" attributes have been overtaken by its "telecommunications" capabilities, there has been a change of heart. Jurisdiction over cable is no longer open for negotiation.

Second, technology sends diverse signals, which causes problems for constitution remakers. On the one hand, competition with its new entrants seeking national markets points towards an enhanced national dimension. One only has to look at the debilitating battle by CNCP Telecommunications seeking to obtain access to the local distribution facilities of non-federally regulated telephone companies to see what lies ahead in the absence of comprehensive national regulation.⁷⁶ On the other hand, the convergence of previously separate technologies will lead to the blossoming of local services such as teleshopping and home security services. Where in the seamless web of information technology do we find guidance for allocation?

Third, the attack on natural monopoly in telecommunications made possible by developments in technology suggests that the first order of business should be to determine the appropriate role for any government and

⁷⁴ "The Implications of the Federal and Provincial Proposals for Regulating Telecommunications: A Lawyer's Perspective", *Telecommunications and the Constitution* (Institute for Research on Public Policy, forthcoming).

⁷⁵ "Control over Communications: Reforms to the Constitutional and Institutional Structures for the 1980's", Keynote Address, *Plenary Session 2*, *supra* note 48 at 6.

⁷⁶ *Supra* note 54.

then to decide the allocation question. While for the purist considerations of actual policy have to be divorced from the constitutional assignment issue, they, nevertheless, inject a further disconcerting element into the debate.

Fourth, as Schultz has urged, the overthrow, under the assault of technology, of the exclusive territories of the old line carriers similarly militates against any exclusivity in regulatory jurisdiction.

Sovereignty, . . . is an increasingly outdated concept in the telecommunications sector. Technology has brought about a convergence, a sharing, of the traditional roles of communications and computer systems. Economics, driven by technology, has forced a realignment that stresses sharing in the roles of the individual participants in the telecommunications system. Carriers, most notably, are no longer capable of invoking the sovereign prerogatives that once dictated their relationships with competitors, with users and with governments. Governments in Canada must also accept that what they once believed were their sovereign powers exist no longer. They at best can be partners, sharing decision-making powers with other governments, with carriers, and with individual users who want to make their own choices.⁷⁷

VIII. VOLATILE TECHNOLOGY AND POLICY MAKING

In backing away from any proposal for constitutional change in the face of rapidly changing technology, Buchan and Johnston went on to conclude: "As the history of attempts to amend the *BNA Act*, or even to reach agreement on an amending formula, has so clearly indicated, it is much easier to amend legislation than it is to amend a constitution."⁷⁸ However, as Mr. Ken Wyman cautioned in evidence before the Peterson Committee, we may be faced, as well, with substantial inhibitions on even legislative initiative.

I personally think that it would be very difficult, and perhaps even undesirable, for Parliament to attempt to put in more specific guidelines. I say that against the background, first of all, of the very rapid developments in technology which are occurring in the industry. I think it would be difficult, and perhaps unwise, to attempt to establish specific guidelines which might not anticipate the way technology is going and where the balance should come as between competition and monopoly.⁷⁹

Similarly, Mr. Charles Dalfen, while still Vice-Chairman, Telecommunications at the CRTC, expressed opposition to any attempt to pass new telecommunications legislation.

There are in my view three grounds for this conclusion [that the existing basic legislative principles are sound]. The first is that the legislative provisions are not wedded to any particular technology or industry arrangement but on elementary notions of fairness and public interest. The second is that they permit the regulator to grant exemptions from regulation as appropriate—in a word to 'deregulate.' The third is that they permit the provincial dimension to be taken into account.⁸⁰

⁷⁷ "Partners in a Game Without Masters: Reconstructing the Telecommunications System", *Telecommunications and the Constitution*, *supra* note 74.

⁷⁸ *Supra* note 74.

⁷⁹ Can. H. of C. Special Comm. on Regulatory Reform, *Proceedings*, (Sept. 18, 1980) at 9.

⁸⁰ *Supra* note 75 at 11.

Should yet another attempt be made to pass a comprehensive telecommunications act, there will, inevitably, be bitter arguments over legal definitions—ostensibly fixed positions in a future of convergence, substitutability and boundary erosion. An inkling of what lies ahead can be seen in the hard fought battle to ensure that the *Canada Post Office Corporation Act* not give the Post Office a monopoly over “electronic mail”—a matter never really effectively defined.⁸¹

Given the need for wide grants of discretion in an attempt to avoid statutory obsolescence, the vexing question of the appropriate role for regulatory agencies will have to be squarely faced.⁸² The need for the resolution of prevailing policy stand-offs between departments and agencies will be critical if surrender to technological determinism is to be avoided. Given the incremental rather than inspirational nature of most policy making in regulation (which will greatly limit the role of policy directives which are sometimes seen as a complete answer to concerns as to political accountability) a volatile technology will make the extent of the major policy development role of non-elected officials even clearer than it is today. Effective parliamentary oversight will require a massive upgrading of standing committee capability. In the United States, this continuing education process is going on at an impressive level; in Canada, with the exception of the Peterson Committee,⁸³ which, it must be recalled, looked at regulation in general, this process has not even started.⁸⁴

It is interesting to note that while the Economic Council of Canada in its final report, *Reforming Regulation 1981* endorsed recent decisions by the CRTC in favour of increased competition in telecommunications, it was concerned that this approach was too narrow a basis on which to build for the future.

In recent decisions the CRTC has introduced some significant elements of competition into telecommunications markets and developed some important principles to be applied in future cases concerned with anti-competitive conduct. We are particularly encouraged that the CRTC has indicated that those who oppose new entry or network access that could enhance effective competition must establish that such initiatives would be contrary to the public interest. While progress has been made, however, competitive markets for telecommunications services are still very much in their infancy. The introduction of competition has been very slow and hesitant; and, as we have indicated, there are a large number of issues still to be resolved. While we do not wish to minimize the complexity of many of the issues involved, we believe that uncertainty has been heightened by the CRTC's reluctance to engage in broad rule-making and to draw out the more general implications of its decisions in specific cases. Although the jurisdiction of the CRTC is limited to a significant extent, and much more so than its counter-

⁸¹ See, e.g. Can. H. of C. Standing Comm. on Miscellaneous Estimates, *Proceedings*, No. 34-41 (Dec. 12, 1980). And see Can. S. and H. of C. Standing Joint Comm. on Regulations and Other Statutory Instruments, *Proceedings*, No. 14-17 (Dec. 15, 1980).

⁸² As urged in Janisch, *Policy Making in Regulation: Towards a New Definition of the Status of Independent Regulatory Agencies in Canada*, (1979) 17 O.H.L.J. 46.

⁸³ *Supra* note 74.

⁸⁴ Although the recent reference of the Proposed Domestic Air Carrier Policy to the H. of C. Standing Comm. on Trans. and Communications, *supra* note 72, may be seen as discouraging.

part in the United States, there remains scope for decisions of relatively general application. The present approach of the CRTC emphasizes the uniqueness of particular situations. There is a need to recognize the basic similarity in the variables affecting the public interest in different situations. Besides adding to uncertainty, the present approach taxes the resources of the CRTC and greatly increases the costs of the regulatory process to individual participants. We believe that there is an insufficient appreciation of these costs and of the corresponding savings that could be achieved by a greater reliance on broad rule-making.⁸⁵

Up to this point, the CRTC has met criticisms that it is deciding major policy issues by emphasizing that it has been responding to specific applications and that it is charged with a statutory duty to make decisions on such applications.⁸⁶ Thus any move by the Commission to respond to the Economic Council of Canada's urgings to adopt broader rule-making in response to technology induced opportunities for competition will undoubtedly exacerbate the issue of political accountability.⁸⁷

IX. COMPETITION POLICY AND TECHNOLOGICAL INNOVATION

Clearly the new environment for microelectronics calls for a dynamic response which assumes that rates of technological change, innovation, obsolescence and service explosion will continue unabated—that multiple industries will participate in research and development, manufacturing, facilities and services and that boundary line separations have become so indistinguishable as to render their use impossible for regulatory purposes. The dynamic response assumes that technology driven multi-industry entry, demand elasticity, demand growth, non-price innovation and multi-industry participation have rendered the last justification for public utility regulation, economics of scope, essentially irrelevant. In short, market dynamics will supersede the need for regulatory intervention as natural monopoly is rendered an anachronism. Technology, if allowed, will act as the great deregulator.

While the static response of traditional public utility regulation is quite obviously inappropriate in that it is predicated on a central assumption of stable technology, it would appear that Canada will move, at best, towards a compromise; a response which preserves a major monopoly sector centred around the local distribution facilities of the existing telephone companies. Some degree of competition under a variety of regulatory ground rules (for example, cost separations or separate subsidiaries) will be tolerated or, perhaps, even encouraged in other sectors.

The central issue of public policy which emerges from this prognosis is whether this type of compromise is inherently and irredeemably flawed, or whether it will be possible, by determined intervention in the regulatory process, to bring about some marginal improvement by pushing the compromise towards a more dynamic approach.

⁸⁵ Economic Council of Canada, *supra* note 56, at 48-49.

⁸⁶ As, e.g., in the *CNCP* decision, *supra* note 54, at 101.

⁸⁷ For some insights into the gathering storm over policy making allocation particularly in a period of rapid technological change, see the evidence of Jean Fournier, Senior Assistant Deputy Minister (Policy), Department of Communications and John Meisel, Chairman of the CRTC and his fellow commissioners and staff before the "Peterson Committee", *supra* note 79, Issues 3 and 6 (Sept. 1980).

As noted earlier, moves towards this compromise have already greatly increased the burden on, and expectations of, the regulatory system. This will surely be an area of exponential growth. Consider but three problems which will soon have to be faced should a compromise response be embarked upon: boundary questions, subsidies for local service, and the seductive charms of separate subsidiaries.

In the early 1970's, the FCC undertook a major inquiry into the regulatory and policy problems raised by the emerging interdependence of computer technology, its market applications and communications common carrier services. The central issue here was the extent to which, if at all, common carriers, especially AT&T, should be allowed to enter data processing and provide enhanced services. As a result of this, the First Computer Inquiry,⁸⁸ a policy was developed based on the state of the art as it then existed.

During the 1970's there were significant advances in computer hardware and software. In particular, dramatic advances in large-scale integrated circuitry and microprocessor technology permitted the development of mini-computers and micro-computers which were capable of duplicating many of the data-manipulative capabilities which were earlier available only at centralized locations housing large scale general-purpose computers. This new technology led to a quite different use of the telecommunications network as it became possible to remove some of the computing power from the centralized computer location. While this provided significant new opportunities to the carriers it also undermined the essential technological assumptions of the First Computer Inquiry.

So drastic and far reaching were these technological changes that the FCC was forced to conclude by the end of the decade that any attempt simply to revise the definitional structure would be inadequate. Yet it still felt obliged to draw *some* kind of a line for regulatory purposes. In the end, a broad distinction was made in the Second Computer Inquiry⁸⁹ between "basic" and "enhanced services" with the major telephone companies only being allowed to provide enhanced services by way of "separate subsidiaries". However, a waiver clause was provided so that where it was alleged that a service which fell into the "enhanced" category, and thus could not be provided by AT&T except through a separate subsidiary, could only be offered through the subsidiary at substantially increased cost, then it could be provided as part of basic service.

AT&T has recently applied for such a waiver for its new Customer Calling services. These new services include "call answering", which connects callers to a customer's recorded greeting when the phone is not answered, and "advance calling", which allows customers to record messages and transmit them to another number without redialing. Both new services may be

⁸⁸ *Regulatory and Policy Problems Presented by the Interdependence of Computer & Communications Services & Facilities*, 28 FCC (2d) 267 (1971).

⁸⁹ *Amendment of section 64.702 of the Commission's Rules and Regulations*, 77 FCC (2d) 384 (1980).

obtained by customers away from home through a remote access option. Naturally, would-be competitors, such as answering services, are profoundly disturbed by the claim that such services should be provided by AT&T as a basic service.⁹⁰

This American regulatory experience which, after all, simply mirrors contemporaneous technological boundary erosions, suggests that divisions such as those between basic and enhanced services without which a compromise approach cannot work, exist more readily in regulatory theory than technological reality. Regulators are more likely to find, when facing the high tide of technology, that they possess Canute's more limited powers than those of Moses.

The issue of the extent to which toll should subsidize local service has become, as we have seen, exacerbated by the failure to resolve its central federal-provincial dynamic. Regulators have been left wandering in a social and political minefield. Should toll rates be kept as low as possible in the interests of national unity or should they be kept high in order to subsidize local rates? Should new carriers specializing in toll service for large corporations be excluded on the grounds that they are skimming off the cream best allocated to impecunious residential subscribers? Or should this whole issue be finessed by a bold regulator in favour of direct subsidies or a budget service? To say that some accommodation has to be arrived at between two worthy objectives is hardly an answer as it leaves the regulators caught between irreconcilable claims to low local rates, where technology has not yet had any substantial impact on costs, and low toll rates where it has.⁹¹

The notion that separate subsidiaries should be employed where telephone companies enter into the competitive market is one which enjoys growing regulatory support. However, even aside from the apparently inherent internal inconsistency in the whole concept of a "separate subsidiary", the sheer relative size of such new entities carries with it a range of problems. For example, "Baby Bell" the proposed subsidiary offspring of AT&T in 1982 will have assets of \$19 billion, revenues of \$8 billion and 130,000 employees at the moment of birth.⁹² Under what conditions should this instant giant be allowed to enter the competitive market? How separate should it be with respect to research and development, financing, marketing and the like? How will it be possible to police its relations with "Mother Bell"?⁹³

⁹⁰ The application for waiver was denied, *American Telephone and Telegraph Company Petition for Waiver of Section 64.702 of the Commission's Rules and Regulations*, 88 FCC (2d) 1 (1981).

⁹¹ The CRTC has just started to address these issues in its *TCTS* decision, *supra* note 59.

⁹² "A.T. & T. Divides to Conquer", *New York Times*, 27 Sept. 1981, sec. 3 at 1, col. 2-4.

⁹³ For a sharply critical assessment of the FCC's struggle with this issue, see Comptroller General of the United States, "Deregulation of Enhanced Services and Customer Premises Equipment - Using Separate Subsidiaries as a Procompetitive Tool" in *Report to Congress: Legislative and Regulatory Actions Needed to Deal with a Changing Domestic Telecommunications Industry*, (Washington: U.S. General Accounting Office, 1981) ch. 6.

A measure of the Canadian regulatory system's ability to handle the compromise approach will soon be forthcoming with respect to the provision of enhanced telecommunications services such as those mentioned earlier in the paper. This is an issue which will have to be dealt with by way of the broader rule-making process favoured by the Economic Council of Canada if the CRTC is not to be overwhelmed in a welter of individual decisions. It will require a detailed consideration of the nature of enhanced services and of the ability of carriers and others to provide such new services in a period of ever increasing technological innovation. Assuming that there will be no turning back of the clock to a static, public utility approach, the CRTC will have to create boundaries and determine the appropriate use of separate subsidiaries and the role of detailed cost allocation procedures. Such an undertaking has been graphically, and accurately, described as a journey to the centre of the earth.⁹⁴

X. CONCLUSION

In returning to what has been identified as the central issue of public policy, namely the extent to which improvement can be brought about through the regulatory process, it must be recognized that the CRTC has taken significant steps with respect to system and terminal competition thereby shifting away from a static approach to regulation. Indeed, the Economic Council of Canada in its report did little more than endorse what had already been accomplished by the CRTC and call for more of the same. There is cause for guarded optimism. At the same time, of course, it has to be kept in mind that these advances have been made on the somewhat narrow basis of individual rulings on discrimination rather than on the broader, positive basis of public benefit from competition. Yet as Kaiser has pointed out, the Director of Investigation and Research has been quite successful in his interventions in telecommunications matters.⁹⁵ His impact should be further consolidated and enhanced by the creation of a new regulatory intervention group which will specialize in regulatory work.

A particularly useful measure of the extent to which large scale Canadian technology will be capable of meeting the demands of the market place will be seen in the long overdue move of Telidon, a highly sophisticated teletex system developed by the Department of Communications, into the private sector.⁹⁶ It is striking, to say the least, to compare the leisurely technology for technology's sake approach which has prevailed in the technical development of Telidon with the total commitment to a belief, so graphically described by Kidder in *The Soul of a New Machine*,⁹⁷ that a new computer has to "make it out the door", that is, be immediately commercially viable.

⁹⁴ Irwin, "A Whole New Way to Figure A.T. & T.'s Rates", *Business Week*, 14 Feb. 1977 at 86. Irwin is chairman of the FCC Common Carrier Bureau's Cost Analysis Task Force.

⁹⁵ Kaiser, "Competition Law and the Regulated Sector", *Canadian Competition Policy: Essays in Law and Economics* (Toronto: Butterworths, 1979).

⁹⁶ For news of this development, see *Telidon Reports*, a newsletter published on an irregular basis by the Department of Communication, Ottawa.

⁹⁷ (Boston: Little, Brown and Company, 1981).

As noted earlier, Canada is approaching the technological ferment in telecommunications with considerable anxiety. There is a great danger that an attempt will be made to further broaden the scope of the regulatory process to accommodate all these concerns. Take, for example, the concern that competition in the provision of terminal attachment equipment will lead to a destructive influx of foreign equipment. There has already been a call for the CRTC to ensure that only equipment manufactured in countries which allow reciprocal attachment rights to Canadian manufacturers should be allowed to benefit from a liberalized attachment policy. It is very doubtful whether this complex issue of trade policy can be adequately dealt with within the regulatory process. Similar concerns as to privacy, research and development and employment will have to be dealt with elsewhere, although means will, no doubt, have to be found for some degree of co-ordination. Should these matters be simply added to the CRTC's agenda, then the overloaded ark will surely founder long before the dove returns with its message of hope.

In the compromise approach, regulators will be subjected to immense pressures from established carriers employing established technology in which they have massive investments. Dalfen has stated: "Surely there is nothing abnormal about the prospect of one technology, to some degree, displacing another."⁹⁸ Yet this greatly understates the gargantuan reality of entrenched technology and the ability of carriers to couch their resistance to competition in patriotic and humanitarian terms. It will be a temptation for regulators to inhibit competition in the name of the "little old ladies of Montreal" who, it is said, have their life savings invested in the integrity of Bell Canada's copper network or in the name of Canadian sovereignty or culture. Technological innovation threatens established ways of doing things with their tendency to sanction inefficiency in the name of higher goals.

Considerations such as these must yet further temper any optimism as to the ability of the regulatory process to move towards a more dynamic response to the changed microelectronic environment. Indeed, recent experience would suggest that there simply cannot be effective partial deregulation. Either the nettle must be grasped or left well alone. Such is Kahn's advice:

... I originally thought that ... we ought to move very cautiously, examining the results every step of the way in hope of minimizing the disruptions and distortions of the transition; my present conviction is that ... we must make the act of faith and move as rapidly as possible to [deregulation].⁹⁹

The great danger in the compromise response to dynamic technological change is that Canada will fall between the two stools of regulation and the market and end up with the drawbacks of both and the advantages of neither.

⁹⁸ *Supra* note 75, at 7.

⁹⁹ Kahn, "Applying Economics to an Imperfect World", *Regulation*, Nov. - Dec. 1978, at 63.

